

## CLAIMS

1. A method of synthesizing electronic components incorporating nanoscale filamentary structures, the method comprising the operations consisting in:

- 5           · depositing, in an nanoporous membrane, a metal catalyst suitable for penetrating into at least some of the pores of the nanoporous membrane ; and
- causing filamentary structures to grow on the catalyst in at least some of the pores in the nanoporous
- 10 membrane ;

          the method being characterized by the fact that it further comprises the operations of preparing the nanoporous membrane in a manner suitable for ensuring that the wall of the pores includes a single-crystal

15 zone, and growing at least some of the catalyst epitaxially on said single-crystal zone.

2. A method according to claim 1, in which calibrated pores are made in the nanoporous membrane.

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3. A method according to claim 1, in which the nanoporous membrane is made in a manner suitable for ensuring that it extends substantially in a plane, and the pores are made in a manner suitable for ensuring they are oriented

25 substantially perpendicularly to the plane of the membrane.

4. A method according to claim 1, in which the nanoporous membrane is made in a manner suitable for ensuring that

30 it extends substantially in a plane, and the pores are made in a manner suitable for ensuring they are oriented substantially parallel to the plane of the membrane.

5. A method according to claim 1, in which the single-crystal zone of the wall of the pores in the nanoporous

35 membrane corresponds to the bottom of the pores.

6. A method according to claim 1, in which the nanoporous membrane is made by anodic oxidation of a single-crystal substrate.

5 7. A method according to claim 1, in which the nanoporous membrane is made in a thin layer transferred or deposited onto a single-crystal substrate.

8. A method according to claim 7, in which a barrier  
10 layer is made on the single-crystal substrate, prior to transferring or depositing the thin layer onto the single-crystal substrate, the material of said barrier layer forming a diffusion barrier and being suitable for preventing the catalyst, at least in part, from being  
15 contaminated by the material constituting the substrate.

9. A method according to claim 1, in which, prior to growing the catalyst in at least some of the pores of the membrane, a diffusion barrier forming material is  
20 deposited that is suitable for preventing the catalyst, at least in part, from being contaminated by the material underlying it.

10. A method according to claim 1, in which the catalyst  
25 is deposited in at least some of the pores by electroplating.

11. A method according to claim 1, in which the catalyst is deposited in at least some of the pores by chemical  
30 gas deposition.

12. A method according to claim 1, in which the catalyst is deposited in at least some of the pores of the nanoporous membrane, and then the catalyst as deposited  
35 in this way is annealed.

13. A method according to claim 12, in which annealing is performed under a magnetic field.

14. A method according to claim 1, in which an electronic  
5 component is made on the nanoporous membrane.

15. A method according to claim 1, in which the nanoscale  
filamentary structures are carbon nanotubes.

10 16. A method according to claim 15, in which the catalyst  
comprises a transition metal.

17. A method according to claim 1, in which the  
filamentary structures are deposited by chemical vapor  
15 deposition.

18. A method according to claim 1, in which the nanoscale  
filamentary structures are nanowires or nanorods.

20 19. A method according to claim 18, in which the catalyst  
is a metal from the list comprising gold and aluminum.

20. A component for electronics including at least one  
nanoscale filamentary structure obtained by the method  
25 according to claim 1, the component comprising:

- a nanoporous membrane in which the pores include a  
single-crystal zone; and
- a metallic catalyst deposited in at least some of  
the pores of the nanoporous membrane, at least part of  
30 the catalyst being grown epitaxially on the single-  
crystal zone of the nanoporous membrane.

21. A component according to claim 20, in which at least  
a portion of the nanoporous membrane constitutes an  
35 electrode enabling a voltage to be imparted to at least  
one filamentary structure deposited in another portion of  
the nanoporous membrane.

22. A component according to claim 20, lying on a  
substrate and including at least one filamentary  
nanoscale structure extending parallel to the plane of  
5 the substrate.

23. A component according to claim 20, including an  
electrode itself having an extension in a pore of the  
nanoporous membrane.  
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24. A component according to claim 20, in which at least  
one filamentary nanoscale structure is a carbon nanotube.

25. A component according to claim 20, in which at least  
15 one filamentary nanoscale structure is a rod or a wire.